

Unique Identifier for People, the NIH ID Number v1.0

1.1 Purpose and Status of this Memo

This document specifies a standards-track NIH architecture standard and requests discussion and suggestions for improvements. Please refer to the “NIH Architecture Standards Process” (NRFC 0001) for the current status of this standard.

Abstract

This memo documents the standard for a Unique Identifier for People, the **NIH ID Number**, which provides a convenient, public representation of the identities of individuals who use NIH resources and services. This memo defines the characteristics of the NIH ID Number, describes its background and current uses, and presents recommendations for NIH business managers, application designers/developers, and security officers.

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1 Introduction

The **NIH ID Number** is a unique identifier for people, which provides a convenient, public representation of the identities of individuals who use NIH resources and services. It is a 10-digit number, managed much like the more familiar Social Security Number (SSN), except that since its use is limited to NIH, its public disclosure does not raise privacy and identity theft concerns. The NIH ID Number is mainly useful as a primary key for people records.

The NIH ID Number is beneficial because it:

- reduces the need for multiple copies of data related to people,
- reduces data entry,
- simplifies database and application development, and
- improves interoperability by making it easier to join people data across independently developed and maintained databases.

2 Background

In 1994, NIH formed an information technology Architectural Management Group (AMG) consisting of representatives from each of its Institutes and Centers (ICs). The AMG's broad goal was to define a uniformly supported, interoperable, IT architecture to enable NIH users to transparently access and use the platforms, processes, and data they need to do their work.

The AMG's *Report on Interoperability at the NIH* [1] issued in May, 1997, recommended that "Unique personal identifiers (not the Social Security Number) must be defined".

The NIH Acting CIO subsequently approved the formation of a small Technical Subcommittee, the AMG TSC [2], to further develop the concept and design of a unique identifier for people and an NIH electronic directory service. The AMG TSC was comprised of technical experts from several ICs, who met regularly from August 1997 through November 1998.

The AMG TSC designed a unique identifier for people to reliably associate with an individual all the related information stored in the electronic directory and various other NIH systems and databases. After considering many alternatives and surveying practices at other organizations, the AMG TSC recommended a 10-digit NIH ID Number with the characteristics described in Section 3 *Requirements* below (see the AMG TSC's final *Architecture Review* [3]).

The AMG adopted this recommendation at their quarterly meeting on October 15, 1997.

The NIH ID Number with the AMG-approved characteristics was implemented as part of the NIH Enterprise Directory (NED) [4] and deployed for production use in May 2000.

As of June, 2005, NED contained NIH ID Numbers for over 80,000 individuals. Table 1 summarizes how some major enterprise applications use the NIH ID Number:

Table 1 Summary of enterprise applications using the NIH ID Number

<i>Application</i>	<i># Records as of 6/2005</i>	<i>NIH ID Number Use</i>
NIH ID Badge and Card Access System	42,000	Printed on and recorded in barcode and magnetic stripe (magstripe) on NIH ID badges
NIH Telephone Directory	47,000	Primary key
NIH Clinical Center Library Patron Database	27,000	Reads barcode on NIH ID badges to look up patron records
OS/390 Customer Registry	58,000	Integrates applications requiring OS/390 userid with NIH Login; links to account owner's customer information in NED
NIH Intramural Database	23,000	Links to intramural researcher information in NED; NIH Login
NIH Active Directory	35,000	Identifies account owners for NIH Login
Parking and Transhare System (PARTS)	47,000	Reads barcode on NIH ID badges to look up parking permit holder and Transhare participant records

3 Requirements

3.1 Scope

An NIH ID Number will be assigned to every individual registered in the NIH Enterprise Directory (NED). Individuals eligible to be assigned NIH ID Numbers are defined in *CATEGORIES OF INDIVIDUALS COVERED BY THE SYSTEM* [5]:

*Users of NIH resources and services including but not limited to: current and past NIH employees, contractors, tenants of NIH facilities, participants in the NIH visiting programs, registered users of NIH computer facilities, grantees, reviewers, council members, collaborators, vendors, and parking permit holders. **This system does not cover patients and visitors to the NIH Clinical Center.***

Note: Individuals outside this scope may not be assigned NIH ID numbers; changing the scope of the NIH ID Number requires an amendment to the NED System of Records notice.

Rationale: Enables the use of the NIH ID Number as the primary key for people records.

3.2 Uniqueness

No two individuals should be assigned the same NIH ID Number.

Rationale: Enables the use of the NIH ID Number as the primary key for people records.

3.3 Singularity

An individual should not be assigned more than one NIH ID Number.

Rationale:

- Unambiguously identifies an individual.
- Simplifies applications by eliminating the need to handle multiple aliases for the same individual.
- Avoids multiple records for the same person in databases and directories.

3.4 Persistence

An individual should have the same NIH ID Number throughout their entire career.

Rationale:

- Supports applications that must retain historical information related to an individual across multiple, discontinuous tours of duty at NIH in varying roles; for example, tracking an individual's research publications, documents, cumulative radiation exposure, and patents.
- Supports retention of services and authorizations across continuous tours of duty at NIH in varying roles; for example, retaining an individual's email account when converting from an Employee to a Contractor.
- Facilitates problem diagnosis and recovery from accidental deregistration.

3.5 Form

The NIH ID Number will be a 10-digit decimal number of the form *ddddddddd**c* for example, 0010147906. To improve readability, the NIH ID Number may be displayed in the form *ddd-dddd-ddc*, for example, 001-0147-906. The rightmost digit will be a check digit computed from the other nine digits using the ISO 7064 MOD 10,11 check digit standard [6].

NIH ID Numbers in the range 000-0000-006 through 000-9999-992 are reserved for internal use by applications; for example, for testing.

Rationale:

- Easily generated and unchanging over an individual's entire career, as opposed to identifiers based on an individual's name.
- Compatible with the numeric-only barcode standard [7] used by the NIH Library and NIH Parking and Transhare System (PARTS).

- May be embedded in 16-digit ISO/IEC 7812-1 [8] identification numbers used by financial applications, for example, credit and debit cards: *nnnn nndd dddd ddds* where *nnnn nn* is the Issuer Identification Number (IIN), *dd dddd ddd* is the NIH ID Number without the check digit, and *s* is the ISO/EIC 7812-1 check digit.
- Simple to enter via numeric keypads.
- Inclusion of a check digit detects most common transcription errors.
- The displayable form *ddd-dddd-ddc* avoids confusion with telephone numbers.

4 Recommendations

1. NIH resources and services should not be provided to an individual meeting the scope requirement of Section 3.1 until a Registration Authority (RA) has bound and registered an NIH ID Number for the individual as described in [9].
2. NIH business processes and applications should routinely collect and use the NIH ID Number to identify individuals.
3. NIH business processes and applications should routinely collect and use the NIH ID Number to identify the users of NIH resources and services such as:
 - computer accounts
 - keys
 - parking
 - radioactive or biohazardous materials
 - property and equipment
 - computer and data processing assistance
 - facilities and equipment maintenance
 - library and equipment loans
4. NIH business processes and applications should collect an individual's NIH ID Number by scanning the barcode or reading the magstripe on their NIH ID badge. This procedure authenticates the badge holder as the individual identified by the NIH ID Number and eliminates manual data entry and transcription error.
5. Applications that process manually-entered NIH ID Numbers should validate their check digits using the algorithm described in Appendix A.
6. A secret Personal Identification Number (PIN) should be associated with the NIH ID Number so that an individual can authenticate to on-line applications using their NIH ID Number and PIN instead of presenting their NIH ID badge in person. Uses include:
 1. securing distribution of passwords and private encryption keys,

2. securing password resets, and
3. securely correcting links between NIH ID Numbers and NIH Login accounts.

5 Related Standards and Practices

5.1 HHS Employee ID Number

The HHS Employee ID Number (EmplID) assigned by the HHS Enterprise Human Resources and Payroll (EHRP) System [10] is not a substitute for the NIH ID Number because, at this time, it does not meet the requirements of Section 3.1 *Scope* and Section 3.4 *Persistence*.

The EmplID also does not support Recommendations 1 through 4 of Section 4 above. As a payroll system, the EHRP operates one pay period in arrears; thus, an EmplID may not be assigned to a new employee until the end of the employee's first pay period. However, a new employee typically requires NIH services or resources (for example, a security background check, NIH ID badge, or email account) sooner—at any time after he or she is hired. An NIH ID Number should be bound, registered, and associated with these services and resources.

5.2 Personal Identity Verification of Federal Employees and Contractors

Federal Information Processing Standards Publication 201: *Personal Identity Verification (PIV) of Federal Employees and Contractors* [11] describes the minimum requirements for a Federal personal identity verification system that meets the control and security objectives of Homeland Security Presidential Directive 12, and defines a standard to be used by Federal agencies for authenticating the identity of Federal employees and contractors (including contractor employees) for gaining physical access to Federally-controlled facilities (e.g. card access systems) and logical access to Federally-controlled information systems (e.g. single sign-on systems). Identities bound to NIH ID Numbers must therefore be verified as specified by this standard in order to continue to allow them to be used for these purposes.

6 References

- [1] Report on Interoperability at the NIH, <http://nedinfo.nih.gov/AMG/interop.htm>.
- [2] NIH Architectural Management Group Technical Subcommittee, http://www.alw.nih.gov/Other_resources/amgtech.
- [3] NIH Architectural Management Group Technical Subcommittee *Architecture Review*, http://www.alw.nih.gov/Other_resources/amgtech/docs/arch-review/arch-review6.htm.
- [4] *NIH Enterprise Directory Home Page*, <http://nedinfo.nih.gov>.
- [5] U.S. Department of Health and Human Services, National Institutes of Health, “New System of Records 09–25–0216, Administration: NIH Electronic Directory, HHS/NIH”, *Federal Register*, Vol. 65, No. 73, 20181-20183.

- [6] “International Standard ISO 7064: Data Processing—Check Character Systems”, International Organization for Standardization: Ref. No. ISO 7064-1983(E).
- [7] *Codabar Barcode*, <http://www.makebarcode.com/specs/codabar.html>.
- [8] “International Standard ISO/IEC 7812-1: Identification Cards—Identification of Issuers—Part 1: Numbering System”, International Organization for Standardization: Ref. No. ISO/IEC 7812-1:1993(E).
- [9] Department of Health and Human Services, National Institutes of Health, “Unique Identifier for People: Best Community Practice”, NRFC0017 / BCP0008.
- [10] HHS Enterprise Human Resources and Payroll System, <http://www.psc.gov/hrs/ehrp>.
- [11] “Personal Identity Verification (PIV) of Federal Employees and Contractors”, National Institute of Standards and Technology, Federal Information Processing Standards Publication 201, February 25, 2005.

7 Security Considerations

The NIH ID Number raises the following security considerations:

1. Meeting the requirements of Section 3.1 *Scope* and Section 3.4 *Persistence* requires collecting and storing individual identifying information—distinctive information about an individual that never or rarely changes—in a central database, which must be safeguarded from unauthorized read/write access. Compromise risks identity theft and imposter attacks.
2. Association of an account with the NIH ID Number of another individual risks an imposter attack: an attacker who can authenticate using the misidentified account can assume another individual’s identity.

8 Contact

To contact the NRFC Editor, send an email message to EnterpriseArchitecture@mail.nih.gov.

9 Changes

Version	Date	Change	Authority	Author of Change
0.0	7/12/2004	Original Document	Jack Jones	Keith Gorlen
0.1	9/21/2004	Punctuation Changes, NRFC number assigned, and minor formatting.	NRFC0001	Steve Thornton, NRFC Editor

0.2	6/9/2005	Moved Implementation section and related Recommendations to BCP document, updated Table 1, clarified Scope requirement for NIH ID# eligibility, added FIPS 201 PIV related standard, updated References and Author's Address.	Keith Gorlen	Keith Gorlen
0.3	7/14/2005	Reviewed for Plain English	Jack Jones	Michele France
0.4	8/2/2005	Rationalized Plain English and technical accuracy	Jack Jones	Helen Schmitz
0.5	11/15/2005	Edited to improve readability and clarify Section 5.2.	Keith Gorlen	Keith Gorlen
0.6	1/9/2006	Incorporate feedback from review: add date of data in Table 1.	Keith Gorlen	Keith Gorlen
1.0	1/31/2006	Updated version number and added approval date.	Architecture Review Board (1/25/2006 meeting)	Steve Thornton

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Appendix A NIH ID Check Digit Validation Algorithms

Applications may use the code provided in this Appendix to validate the check digit on NIH ID Numbers, which are calculated according to the ISO 7064 MOD 10,11 check digit standard [6].

A.1 C/C++

```
/* Validate NIH ID Number ISO 7064 MOD 11,10 check digit
```

Example usage:

```
    if (valid("0010147906")) {
        // NIH ID Number check digit is valid
    } else {
        // NIH ID Number check digit is not valid
    }
}

*/

#include <ctype.h>
#include <string.h>

bool valid(const char* nihID)
{
    const char* a = nihID;
    unsigned P = 10;
    unsigned S;

    for (int j = 0; j < 10; j++) {
        if (!isdigit(*a)) return false;

        S = P%11 + (*a++ - '0');
        P = S%10;
        if (P == 0) P = 10;
        P += P;
    };

    if (*a != NULL) return false;    /* more than 10 digits in NIH ID */

    return S%10 == 1;
}
```

A.2 Java

```
/* Validate NIH ID Number ISO 7064 MOD 11,10 check digit
```

Example usage:

```
    try {
        NIHID id = new NIHID("0010147906");
        System.out.println("VALID");
    }

    catch(NIHIDException e) {
        System.out.println(e.getMessage());
    }
*/

class NIHIDException extends Exception
{
    public NIHIDException(String s)
    {
        super(s);
    }
}

class NIHID
{
    private String nihID = ""; // 10-digit NIH ID Number

    NIHID(String id) throws NIHIDException
    {
        if (id.length() != 10)
            throw new NIHIDException("NIH ID Number not 10 digits");

        char a;
        int P = 10;
        int S = 0;

        for (int j = 0; j < id.length(); j++) {
            a = id.charAt(j);
            if (!Character.isDigit(a))
                throw new NIHIDException("Non-digit in NIH ID Number");

            S = P%11 + (a - '0');
            P = S%10;
            if (P == 0) P = 10;
            P += P;
        };

        if (S%10 != 1)
            throw new NIHIDException("NIH ID Number check digit NOT VALID");

        nihID = id;          // NIH ID Number is valid
    }
}
```

A.3 JavaScript

```
<head>
<title>NIH ID Number ISO 7064 MOD 11,10 Check Digit Validation</title>

<SCRIPT type="text/javascript">

function valid(nihID) {
  var P = 10;
  var re = /^\\d{10}$\\;/;

  if (!re.test(nihID)) {
    defaultStatus="NIH ID Number NOT VALID";
    alert("10 digits required");
    document.NIHIDEntry.id.focus();
    return;
  }

  for (j=0; j<10; j++) {
    a = Number(nihID.substr(j,1));
    S = P%11 + a;
    P = S%10;
    if (P == 0) { P = 10; }
    P = P * 2;
  }

  if (S%10 != 1) {
    defaultStatus="NIH ID Number NOT VALID";
    alert("NIH ID Number NOT VALID");
    document.NIHIDEntry.id.focus();
    return;
  }

  defaultStatus="NIH ID Number VALID";
}
</SCRIPT>
</head>

<body>
<FORM NAME="NIHIDEntry">
  <h2>NIH ID Number ISO 7064 MOD 11,10 Check Digit Validation</h2>

  NIH ID# (10 digits)
  <INPUT type="text" name="id" size=10
    onBlur="valid(document.NIHIDEntry.id.value)">

<SCRIPT type="text/javascript">
  document.NIHIDEntry.id.focus()
</SCRIPT>

</body>
```

A.4 Perl

```
# Validate NIH ID Number ISO 7064 MOD 11,10 check digit
#
# Example usage:
#
# if (valid('0010147906')) {
#     NIH ID Number check digit is valid
# } else {
#     NIH ID Number check digit is not valid
# }

sub valid {
    return 0 unless $_[0] =~ /^d{10}$/;

    my @chars = split(//, $_[0]);
    my $P = 10;
    my $S;
    for my $a (@chars) {
        $S = $P%11 + $a;
        $P = ($S%10 || 10) * 2;
    }
    return $S%10 == 1;
}
```